Hepatitis B

(Acute, Chronic, Perinatal)

DISEASE REPORTABLE WITHIN 24 HOURS OF DIAGNOSIS

Per NJAC 8:57, health care providers and administrators shall report by mail or by electronic reporting within 24 hours of diagnosis, confirmed cases of all acute and chronic infections, including positive HBsAg tests in pregnant women, to the health officer of the jurisdiction where the ill or infected person lives, or if unknown, wherein the diagnosis is made. A directory of local health departments in New Jersey is available at http://www.state.nj.us/health/lh/directory/lhdselectcounty.shtml.

If the health officer is unavailable, the health care provider or administrator shall make the report to the Department by telephone to 609.588.7500, between 8:00 A.M. and 5:00 P.M. on non-holiday weekdays or to 609.392.2020 during all other days and hours.

December 2008

1 THE DISEASE AND ITS EPIDEMIOLOGY

A. Etiologic Agent

The hepatitis B virus (HBV) is a DNA virus in the family *Hepadnaviridae*. HBV contains numerous antigenic components, including hepatitis B surface antigen (HBsAg), hepatitis B core antigen (HBcAg), and hepatitis B e antigen (HBeAg).

B. Clinical Description and Laboratory Diagnosis

The clinical course of acute hepatitis B is indistinguishable from that of other types of acute viral hepatitis. The incubation period ranges from 60 to 180 days (average of 90 days). Clinical signs and symptoms occur more often in adults than in infants or children, who usually have an asymptomatic acute course. However, approximately 50% of adults who have acute infections are asymptomatic. The preicteric or prodromal phase, from initial symptoms to onset of jaundice, usually lasts from three to ten days. It is nonspecific and is characterized by fever, loss of appetite, vague abdominal discomfort, nausea, vomiting, and sometimes arthralgias and rash, beginning one to two days before the onset of jaundice. The icteric phase is variable but usually lasts from one to three weeks and is characterized by jaundice, light or gray stools, hepatic tenderness, and hepatomegaly. During convalescence, malaise and fatigue may persist for weeks or months, while jaundice, anorexia, and other symptoms disappear. Most acute HBV infections in adults result in complete recovery with elimination of HBsAg from the blood and the production of antibody to HBsAg (HBsAb), creating immunity to future infection. Approximately 1% to 2% of acutely infected persons develop fulminant hepatitis with a case-fatality rate of 63% to 93% (about 200 to 300 Americans each year).

The risk of chronic infection decreases with age at infection. As many as 90% of infants infected at birth (perinatal infection) develop chronic HBV infection, compared with an average of 30% of children infected between one and five years of age and 2% to 6% of those acquiring infection as older children or adults. Chronically infected persons are at increased risk for developing chronic liver disease (e.g., cirrhosis or chronic hepatitis) or liver cancer (primary hepatocellular carcinoma) later in life. Approximately 25% of those infected during early childhood will ultimately die at an early age from the complications of cirrhosis and liver cancer.

Serologic markers of HBV infection vary depending on whether the infection is acute or chronic. Please see Table 1.]for assistance with interpretation of HBV laboratory results. In addition, detection of HBV DNA within the blood can assist with diagnosis.

C. Reservoirs

Humans are the only natural hosts.

D. Modes of Transmission

HBV is transmitted through infected blood or body fluids via a parenteral or permucosal (mucous membrane) exposure. The highest concentrations of the virus are in blood and serous fluids; lower titers are found in semen and even lower titers are found in saliva.

Some examples of parenteral exposures are needle sticks, sharing or reusing nonsterile needles or syringes, transfusion of blood and blood products (rare in the United States due to routine blood donor screening), hemodialysis, acupuncture, body piercing, and body tattooing. The most common permucosal exposure is through perinatal transmission from an infected mother to her infant at birth (vertical transmission) and sexual (heterosexual and homosexual) activity (horizontal transmission). Permucosal exposures also occur in laboratories and healthcare settings, contributing to horizontal transmission in facilities and communities.

Person-to-person spread of HBV can occur in settings involving interpersonal contact over extended periods, such as when a chronically infected person resides in a household. In household settings, nonsexual transmission occurs primarily from child to child, and young children are at highest risk for infection. The precise mechanisms of transmission from child to child are unknown; however, frequent interpersonal contact of nonintact skin or mucous membranes with blood-containing secretions or perhaps saliva are the most likely means of transmission. Transmission from sharing personal objects, such as washcloths, towels, razors, or toothbrushes, also can occur because HBV can survive at ambient temperatures in the environment for days and even weeks. Fecal-oral transmission does not appear to occur. Approximately one third of infected persons do not have a readily identifiable risk factor.

E. Incubation Period

The incubation period of HBV infection is an average of 60 to 90 days, with a range of 45 to 180 days, and can occasionally be as long as six to nine months.

F. Period of Communicability or Infectious Period

A person is considered infectious as long as HBsAg is detectable in the blood. Most people are infectious from one to two months before to one to two months after the onset of symptoms. Persons who have chronic hepatitis B (known as carriers) remain infectious indefinitely. Persons with acute and chronic HBV infection with circulating HBeAg are more infectious than are those that are HBeAg-negative. Measurable serologic levels of HBeAg are associated with higher levels of HBV replication.

G. Epidemiology

Worldwide, HBV is a major cause of chronic liver disease and liver cancer. The frequency of HBV infection and patterns of transmission vary greatly throughout the world. In most areas of the United States, Canada, Western Europe, Australia, and South America, the infection rate is low and occurs primarily in adolescents and adults; 5% to 8% of the total population has been infected, and 0.2% to 0.9% has a chronic infection.

Within the United States there are pockets of high endemicity, including first-generation immigrants from areas where HBV is endemic, among Alaskan Natives, and among low socioeconomic inner-city groups. The highest risk of early childhood infection is in children born to mothers who are from HBV-endemic countries and are carriers of HBV. The majority of early childhood infections, however, occur in African American and white children. Before routine childhood HBV immunization in the United States, an estimated 33,000 children born to HBsAg-negative mothers were infected each year during their early childhood. In developed countries, populations at high risk for HBV exposure include injecting drug users, heterosexuals with multiple partners, homosexual men, residents and staff of institutions for the developmentally disabled, employees in hemodialysis centers, and people in certain healthcare and public safety occupations.

In contrast, in China, Southeast Asia, the Pacific Islands, Eastern Europe, the Central Asian republics, most of the Middle East, Africa, the Amazon Basin, and some Caribbean islands, HBV infection is highly endemic, with a lifetime risk of HBV infection greater than 60%. In these areas, most infections occur in infants or children under the age of five years; 70% to 90% of the adult population has been infected; and 8% to 15% have a chronic infection. In the rest of the world, HBV infection is of intermediate endemicity with chronic HBV carriage occurring in 2% to 7% of the population.

2 REPORTING CRITERIA AND LABORATORY TESTING SERVICES

A. New Jersey Department of Health and Senior Services Case Definitions

1. Acute Hepatitis B

Clinical Case Definition

An acute illness with

- discrete onset of symptoms AND
- jaundice or elevated serum aminotransferase levels

Laboratory Criteria for Diagnosis

- Immunoglobulin M (IgM) antibody to hepatitis B core antigen (HBcAb-IgM) positive (if done)

OR

- Hepatitis B surface antigen (HBsAg) positive

AND

- IgM antibody to hepatitis A virus (HAV-IgM) negative (if done)

Case Classification

CONFIRMED
A case that meets the clinical case definition and is laboratory confirmed.

PROBABLE
Not used

POSSIBLE
Not used

COMMENT
None.

2. Chronic Hepatitis B

Clinical Description

Persons with chronic HBV infection may be asymptomatic. They may have no evidence of liver disease or may have a spectrum of disease ranging from chronic hepatitis to cirrhosis or liver cancer.

Laboratory Criteria for Diagnosis

- IgM antibodies to hepatitis B core antigen (HBcAb-IgM) negative

AND

- a positive result on one of the following tests:

HBsAg,

HBeAg or

HBV DNA

OR

- HBsAg-positive or HBV DNA-positive or HBeAg-positive two times at least six months apart (Any combination of these tests performed six months apart is acceptable.)

Case Classification

CONFIRMED
A case that meets either laboratory criteria for diagnosis

PROBABLE
A case with a single HBsAg-positive or HBV DNA-positive or HBeAg-positive lab result when no HBcAb-IgM results are available.

POSSIBLE
Not used

COMMENT
Multiple laboratory tests indicative of chronic HBV infection may be performed simultaneously on the same patient specimen as part of a "hepatitis panel." Testing performed in this manner may lead to seemingly discordant results, such as HBsAg-negative **and** HBV DNA-positive. For the purposes of this case definition, any positive result among the three laboratory tests mentioned above is acceptable, regardless of other testing results. Negative HBeAg results and HBV DNA levels below positive cutoff level do not confirm the absence of HBV infection.

3. Perinatal Hepatitis B

Clinical Case Definition

Perinatal HBV in the newborn may range from asymptomatic to fulminate hepatitis.

Laboratory Criteria for Diagnosis

HBsAg-positive

Case Classification

CONFIRMED
HBsAg-positive serology in any infant aged 1 to 24 months who was born in the United States or in U.S. territories to an HBsAg-positive mother

PROBABLE
Not used

POSSIBLE
Not used

COMMENT
Infants born to HBsAg-positive mothers should receive hepatitis B immune globulin (HBIG) and the first dose of hepatitis B vaccine within 12 hours of birth, followed by the second and third doses of vaccine at one and six months of age, respectively. Postvaccination testing for HBsAg and HBsAb is recommended from three to six months following completion of the vaccine series. If HBIG and the initial dose of vaccine are delayed for more than one month after birth, testing for HBsAg may determine if the infant is already infected.

B. Laboratory Testing Services Available

The New Jersey Department of Health and Senior Services (NJDHSS) Public Health Environmental Laboratories (PHEL) does not perform routine laboratory testing for HBV for the general public. Testing is usually conducted through private commercial laboratories.

3 DISEASE REPORTING AND CASE INVESTIGATION

A. Purpose of Surveillance and Reporting

- To identify sources/sites of transmission and to prevent spread of disease from such sources.
- To ensure identification of infected pregnant women and prevent perinatal transmission.

B. Laboratory and Healthcare Provider Reporting Requirements

The New Jersey Administrative Code (NJAC 8:57-1.8) stipulates that laboratories report (by telephone, confidential fax, over the Internet using the Communicable Disease Reporting and Surveillance System [CDRSS], or in writing) all cases of HBV infection (acute, chronic, and HBsAg-positive pregnant woman) to the local health officer having jurisdiction over the locality in which the patient lives or, if unknown, to the health officer in whose jurisdiction the healthcare provider requesting the laboratory examination is located. The healthcare providers must report all above cases to the local health officer having jurisdiction over the locality in which the patient lives. Please refer to the lists of reportable diseases at http://www.state.nj.us/health/cd/njac857.pdf for information.

C. Local Health Department Reporting and Follow-Up Responsibilities

1. Reporting Requirements

NJAC 8:57-1.8 stipulates that each local health officer must report the occurrence of acute and chronic HBV infection, as defined by the reporting criteria in section 2A above. Refer to the Health Officers Reporting Timeline (http://www.state.nj.us/health/cd/njac857.pdf) for information on prioritization and timeliness requirements of reporting and case investigation.

2. Case Investigation

1. The health officer (or his/her designee) is responsible for investigating HBV cases. If a laboratory report is received by NJDHSS, the report will be sent to the local health department (LHD) for data entry in CDRSS and case investigation is the responsibility of the LHD. If the patient address is not listed on the lab report, contact the lab or healthcare provider for a complete patient address. The primary objective is to determine if the patient has acute or chronic disease.

2. Correct interpretation of HBV serology will guide the public health investigation.

3. For interpretation of HBV serology, refer to Table 1. In addition, the investigator may need to contact the patient and obtain clinical information from the healthcare provider to determine if the case is an acute or chronic infection and to determine pregnancy status for HBsAg-positive women aged 15 to 45.

4. Case findings must be documented in the comment section of CDRSS' clinical status tab. Pregnancy status is in the clinical status tab; if pregnancy is marked as "yes," additional fields will appear requesting the estimated date of delivery and hospital delivery site. This information is required for perinatal case management.

5. A form letter for healthcare providers (CDS-L2) is available at http://web.doh.state.nj.us/apps2/forms and can be used as needed by the LHD to obtain case information.

6. Use the following guidelines in completing a case report: If possible, accurately record the date and time of the onset of illness and symptoms to establish the incubation period for acute HBV infection (six weeks to six months and determine sexual and household contacts). Some patient information is sensitive in nature. Reassure the patient that all information is kept strictly confidential and is obtained only to determine his/her likely source of exposure and to protect others who might be at risk. If a case is determined to be an acute infection, the following questions should be asked regarding a time period of six weeks to six months prior to illness onset:

    - Hospitalized and/ or surgery including outpatient invasive medical procedures?
    - Residence in a Long Term Care Facility?
    - Receipt of blood transfusion or blood products?
    - Out patient intramuscular injections or intravenous infusions?
    - Dental work and/or dental surgery?
    - Is the patient a diabetic?; if yes,
        (1) Did the patient have multiple finger-stick blood sampling in a healthcare setting?
        (2) Did the patient use a blood glucose-monitoring device at home or while in the healthcare setting?
    - Dialysis or kidney transplant patient?

- Contact with a confirmed or suspect HBV infected person?
- Employment in a medical, dental, or other field that involves contact with human blood?
- Accidental puncture with a needle or other object contaminated with blood?
- Accupuncture, tattooing or body piercing?
- Intravenous recreational drug use?
- Multiple sexual partners?
- Unprotected sexual activity?

7. Institution of disease control measures is an integral part of case investigation. It is the local health officer's responsibility to understand and, if necessary, institute the control guidelines listed below in section 4, Controlling Further Spread.

8. Investigation of infants (aged 1 to 24 months) with HBV serology indicating infection and not immunity from HBV vaccination should be promptly investigated to

    1) determine HBsAg status of the birth mother,
    2) verify the infant's and the mother's country of birth,
    3) verify HBV postexposure prophylaxis consisting of HBIG and HBV vaccination within 12 hours of birth, and
    4) verify the dose dates for administration of the second and third HBV vaccination . Document case findings for HBV vaccination in CDRSS.
    5) Obtain and place in CDRSS the vaccine lot numbers for cases that have received the HBV vaccine

CDRSS Entry

The following table can be used as a quick reference guide to using CDRSS to report a case of HBV infection accurately and thoroughly. Add a new case after performing person search using the case management button.

CDRSS Screen	Required Information
Patient Info	Enter disease name (Hepatitis B) and patient demographics. Enter subgroup of acute or chronic, if known, or mark as "PENDING" if investigation is incomplete.
Addresses	Enter any alternate address. Entering an alternate address will allow other disease investigators to access the case if it pertains to their jurisdiction.

CDRSS Screen	Required Information
Clinical Status	Enter physician and, if applicable, hospitalization information including the name of the hospital. Document pregnancy status. If patient is pregnant, indicate estimated date of delivery, the anticipated delivery hospital, and investigation start date. Disease onset date is usually not known and can be left blank.
Signs/Symptoms	Check appropriate boxes for signs and symptoms, and indicate onset date. Please note if physician did not provide this information. The information is critical to determine if the case is acute or chronic. Individuals with chronic infection "HBV carriers" usually do not have symptoms; indicate asymptomatic infection as appropriate.
Risk Factors	Enter complete information about risk factors, if known. Items 2 to 7 may not be known until investigation has been completed.
Laboratory Eval	Enter appropriate lab tests and results. For acute case investigation, Liver enzymes and total bilirubin lab results are entered in the lab section. Select from the lab test drop down box.
Contact Tracing	Use this screen to enter information about contacts, if known. For perinatal cases, enter the mother of the newborn as a case contact. Search for the mother/case contact in CDRSS using the mother's CDRSS case identification number. HBsAg positive mothers should already be in CDRSS, if not enter the case. For other contacts, please enter information about HBV vaccine or HBIG administration in the CLINICAL STATUS/IMMUNIZATION MODULE. Any contact with serologic evidence of HBV infection and meeting a case definition must also be entered as a CASE in CDRSS.
Case Comments	Enter general comments here if the information does not pertain to a specific topic screen or drop-down. Information entered into the comments box is NOT available to be run in a report. **NOTE:** Other screens also have a "COMMENTS" box.
Epidemiology (optional screen)	Route of transmission may be determined through investigation of risk factors. Document method of case detection (e.g., by receipt of a lab report, through contact investigation, or unknown).

CDRSS Screen	Required Information
Case Classification Report Status	Case status options are "REPORT UNDER INVESTIGATION (RUI)," "POSSIBLE," "PROBABLE," "CONFIRMED," and "NOT A CASE." • All cases entered by laboratories should be assigned a case status of "REPORT UNDER INVESTIGATION (RUI)." • Cases still under investigation by the LHD should be assigned a case status of "REPORT UNDER INVESTIGATION (RUI)." • All perinatal cases should be assigned a case status of "POSSIBLE" until post-vaccination serologic testing is completed (12 – 15 mos. of age). • Upon completion of the investigation, the LHD should assign a case status on the basis of the case definition. "CONFIRMED," "PROBABLE," and "NOT A CASE" are the only appropriate options for classifying a case of HBV infection (see section 2A). Report status options are "PENDING," "LHD OPEN," "LHD REVIEW," "LHD CLOSED," "DELETE," "REOPENED," "DHSS OPEN," "DHSS REVIEW," and "DHSS APPROVED." • Cases reported by laboratories should be assigned a report status of "PENDING." • Once the LHD begins investigating a case, the report status should be changed to "LHD OPEN." • The "LHD REVIEW" option can be used if the LHD has a person who reviews the case before it is closed (e.g., health officer or director of nursing). • Once the LHD investigation is complete and all the data are entered into CDRSS, the LHD should change the report status to "LHD CLOSED." • "LHD CLOSED" cases will be reviewed by DHSS and be assigned one of the DHSS-specific report status categories. If additional information is needed on a particular case, the report status will be changed to "REOPENED" and the LHD will be notified by e-mail. Cases that are "DHSS APPROVED" cannot be edited by LHD staff. If a case is inappropriately entered (e.g., a case of hepatitis C was erroneously entered as a case of hepatitis B) the case should be assigned a report status of "Delete." A report status of "Delete" should NOT be used if a reported case of hepatitis B simply does not meet case definition. Rather, it should be assigned "Not a case" as described above.

D. Other Reporting/Investigation Issues

1. Laboratory-confirmed or healthcare-provider-reported cases of chronic HBV infection **diagnosed** prior to the current reporting year, and **not reported previously** in CDRSS, should be managed as follows in CDRSS:

   a. Enter the patient's illness onset date as reported by provider. If the exact illness date is unknown, enter January 1 if the month and day are not known, followed by the year that the HBV diagnosis was made.

   b. Select the "CONFIRMED" option under "Case Status."

   c. Select "CASE DIAGNOSED IN A PREVIOUS YEAR" from the "Reason for Update" drop-down menu that appears next to the "Case Status" box.

2. Laboratory-confirmed or healthcare-provider-reported cases of chronic HBV infection **previously reported** in CDRSS as "CONFIRMED" cases should be managed in CDRSS as follows:

   a. Verify that the case has been investigated and closed. Duplicative positive hepatitis B serology data does not need to be entered into a DHSS approved confirmed chronic case unless the case-patient is a female of reproductive age.

   b. Reopen cases of all females of reproductive age (15 to 45 years) with positive HBsAg serology and indicate pregnancy status indicated as "YES" or "NO" in CDRSS. CDRSS will automatically open a closed case upon receipt of an electronic laboratory report transmission noting a female or person of unknown gender between the ages of 15 and 45 years.

3. Laboratory profiles suggestive of past infection (positive HBc-IgG and negative HBsAg) or immunity (positive HBsAb, negative HBsAg) should be classified as "NOT A CASE" in CDRSS.

4. Out-of-state cases should also be classified as "NOT A CASE" in CDRSS.

5. Once LHD completes its investigation and assigns a report status of "LHD CLOSED," NJDHSS will review the case. NJDHSS will approve the case by changing the report status to "DHSS APPROVED." At this time, the case will be submitted to the Centers for Disease Control and Prevention (CDC) and the case will be locked for editing. If additional information is received after a case has been placed in "DHSS APPROVED," you will need to contact NJDHSS to reopen the case. This should be done only if the additional information changes the case status of the report.

6. Every effort should be made to complete an HBV investigation within three months of opening a case. Failure to obtain pertinent case information after three attempts (e.g., phone calls to patients/providers on three separate days at different times of the day or letters faxed or mailed to healthcare provider three separate times) should be documented in the "COMMENTS" section of CDRSS."

7. If, upon completion of the investigation, it is determined that the case meets the case definition for an acute, chronic, or perinatal infection, assign the appropriate case status. You do not need to send paperwork to NJDHSS.

8. If, upon completion of the investigation, it is determined that the case does not meet case definition, the case status should be changed to "NOT A CASE." You do not need to send paperwork to NJDHSS.

E. Case Management

1. Pregnant Women

The NJDHSS Perinatal Hepatitis B Prevention Project is responsible for coordinating activities related to the prevention of perinatal transmission of HBV throughout the state. LHDs assume the lead role in their jurisdiction for case management and timely and appropriate follow-up of vaccine doses for the infants, sexual partner, and other identified susceptible household contacts. Case management is comprehensive and involves identifying and counseling the pregnant woman. Contacts should be referred to their medical provider for evaluation, prophylaxis and/or treatment.. Case management of the newborn includes confirmation that the infant has completed the HBV series and post-vaccination serology testing.

Pregnant women who are HBsAg-positive must be entered in CDRSS. Entering the case in CDRSS initiates case management. When the child is born, enter the newborn as a perinatal possible case in CDRSS. Open the case contact tracing tab, add the mother by her CDRSS case ID, select contact source as "PERINATAL EXPOSURE".

For infants born to a HBsAg positive mother who are subsequently placed in a foster home, contact the DHSS Perinatal Hepatitis B Prevention Project staff fir assistance.

Note: Adding the mother through use of the CDRSS case ID will automatically link the mother and the child.

Document the administration dates for HBIG, HBV vaccine doses, and post-vaccination serology in CDRSS. Infants who successfully complete the HBV vaccine series and develop antibodies, anti-HBs positive and HBsAg negative are then classified as "NOT A CASE." Infants who test positive for HBsAg are considered a perinatal "CONFIRMED CASE." Perinatal cases can remain open in CDRSS for up to 24 months to allow time for case management.

2. Other Cases

All other identified cases of HBV infection should be counseled and referred to their medical providers for evaluation. Contacts of newly identified cases should also be counseled and referred to their medical providers for evaluation and testing.

4 CONTROLLING FURTHER SPREAD

A. Isolation and Quarantine Requirements (NJAC 8:57-1.12)

The current recommendations of the CDC and NJDHSS are as follows:

Minimum Period of Isolation of Patient

No restrictions except for exclusion from organ and blood donation and counseling to modify activities in order to prevent transmission.

Minimum Period of Quarantine of Contacts

High-risk contacts should receive HBIG and vaccine. Infants born to infected women should also receive HBIG and vaccine.

B. Post-exposure Prophylaxis

Products available for postexposure prophylaxis include HBIG and HBV vaccine.

1. Infants Born to HBsAG-positive Mothers

a. Give HBIG (0.5 mL IM) and HBV vaccine according to Table 2.
b. Screen the infant for HBsAg and HBsAb at 12 – 15 months of age or two to three months after the last vaccine dose. If HBsAg is not present and HBsAb concentration is 10 mIU/mL or greater, the infant is protected.
c. Infants who do not respond to the initial vaccine series (HBsAb concentration is less than 10 mIU/mL and HBsAg-negative) should be given a second three-dose series of HBV vaccine (same schedule as initial series). The physician should retest the infant for adequate antibody response two to three months after the last vaccine dose.
d. Infants who become HBsAg-positive should be referred for comprehensive medical management. Ensure the laboratory data (positive HBsAg and negative HBsAb) is entered in the CDRSS and case is confirmed as a perinatal infection.
e. Infants born to mothers whose HBsAg status is not known should be given HBV vaccine within 12 hours of birth while awaiting the mother's HBsAg status. If the mother is HBsAg positive, the infant should receive HBIG as soon as possible, within seven days of birth. This child should then complete the three-dose HBV vaccination series according to Table 2. Upon completion of the vaccine series, the infant should be screened for HBsAg and HBsAb as above. If the mother is determined to be HBsAg negative, the infant should complete the three-dose HBV vaccine series according to the immunization schedule in Table 4.

2. Other Contacts

a. Unvaccinated infants exposed to a primary caretaker with acute HBV infection should receive a single dose of HBIG and the first dose of the HBV vaccine series as soon as possible. The infant should complete the three-dose HBV vaccine series according to the immunization schedule in Table 2.

b. Household and sexual contacts of a person with acute or chronic HBV infection or an individual who sustains a percutaneous or mucosal exposure to a potentially HBsAg positive source should receive HBIG and HBV vaccine in accordance with Table 3.

C. Pre-exposure Prophylaxis

Individuals should be immunized in accordance with ACIP guidelines which can be accessed at http://www.cdc.gov/vaccines/pubs/ACIP-list.htm.

D. Managing Special Situations

1. School and Daycare

The risk of HBV transmission in school and day-care settings has always been very low. This risk is now even lower because the proportion of susceptible children is decreasing as requirements for HBV vaccination for entry into kindergarten, grades 1 and 6, and high school have been implemented. To prevent the transmission of HBV and other bloodborne diseases in these settings, however, the following guidelines should be followed.

Primary prevention: Ensure compliance with all HBV vaccination requirements for schools and day-care centers. Vaccination is also recommended for unvaccinated classmates of HBV carriers who behave aggressively (e.g., biting, frequent scratching) or who have medical conditions, such as open skin lesions (e.g., generalized dermatitis or bleeding problems) that increase the risk of exposing others to infectious blood or serous secretions.

Secondary prevention: Persons exposed to potentially infectious blood or other body fluids should be offered postexposure prophylaxis as outlined in Table 4. However, in the case of a bite by a person whose HBV status is unknown, it is unlikely that it will result in transmission, and blood testing is not recommended for either biter or victim. The risk of HBV acquisition when a susceptible child bites an HBV carrier is not known. However, most experts would not give HBIG to the susceptible biting child who does not have oral mucosal disease when the amount of blood transferred is small.

Notification: Parents may wish to inform the school nurse or day-care program director about a child who is a known HBV carrier to allow for proper precautions and assessment of behavior issues that could facilitate transmission. However, this is not necessary since

policies and procedures to manage exposure to blood or blood-containing materials should already be established and implemented. Parents of other children attending the school/day care do NOT need to be informed.

Exclusions: Adults and children ill with acute HBV infection should stay home until they feel well and fever and jaundice are gone. There is no reason to exclude a person with HBV infection from employment or attendance once he/she has recovered from the acute illness. Admission of a known HBV carrier with specific risk factors, such as biting, open rashes or sores that cannot be covered, or bleeding problems, should be assessed on an individual basis by the child's doctor, school/day care, and responsible public health authorities. Because these children pose a risk to others in day care, consideration may be given to exclusion from day care until the aggressive behavior ceases or until all contacts have been vaccinated. However, over the next few years, the proportion of children who are vaccinated will increase. Concern about bites and HBV transmission should also decrease over this time period.

Prevention Guidelines: School staff must receive training regarding the school's Exposure Control Plan for the prevention of bloodborne pathogens as defined by the Occupational Safety and Health Administration (OSHA) Bloodborne Pathogen Standard. Students should be provided age-appropriate instruction regarding hand washing, personal hygiene and the modes of transmission of bloodborne pathogens including HBV.

- Ensure the availability of appropriate personal protective equipment including gloves for staff at risk for contact with blood or body fluids.
- Ensure the availability of hand-washing supplies and procedures. .
- Always treat all blood and body fluids as potentially infectious and ensure that school staff practices appropriate standard precautions.
- Do not permit sharing of personal items that may become contaminated with blood or body fluids, such as toothbrushes or razors.
- Cover open skin lesions.
- Dispose of items contaminated with blood or body fluids appropriately
- Ensure appropriate decontamination of environmental surfaces..

2. Reported Incidence is Higher than Usual/Outbreak Suspected

If the number of reported cases in your city/town is higher than usual, or if you suspect an outbreak, investigate clustered cases in an area or institution to determine the source of infection. If evidence indicates a common source, applicable preventive or control measures should be instituted. Consult the NJDHSS VPDP at 609.588.7512.

Additional Information

The NJDHSS VPDP can be reached at 609.588.7512 for information about hepatitis B and perinatal hepatitis B case management.

A Hepatitis B Fact Sheet can be obtained at the NJDHSS Web site at http://www.state.nj.us/health/. Click on the "Health Topics A-Z" link and scroll down to "Hepatitis B." Call 609.588.7512 to contact the hepatitis B coordinator.

CDC's Viral Hepatitis Program Web site: http://www.cdc.gov/ncidod/diseases/hepatitis.

Hepatitis B Foundation Web site: http://www.hepb.org.

Immunization Action Coalition Web site: http://www.immunize.org.

Hepatitis B Reporting Letter, CDS-L2: http://web.doh.state.nj.us/forms.

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TABLES

Table 1. How to Interpret Common Hepatitis B Panel Results

Tests	Results	Interpretation
HBsAg HBcAb HBsAb	Negative Negative Negative	Susceptible
HBsAg HBcAb HBsAb	Negative Negative Positive with ≥ 10mIU/mL*	Immune due to vaccination
HBsAg HBcAb HBsAb	Negative Positive Positive	Immune due to past infection
HBsAg HBcAb HBcAb - IgM HBsAb	Positive Positive Positive Negative	Acutely infected
HBsAg HBcAb HBcAb - IgM Anti-HBs	Positive Positive Negative Negative	Chronically infected
HBsAg HBcAb HBsAb	Negative Positive Negative	Four interpretations possible†
HBeAg	Positive	Marker of increased infectivity. Seen in those individuals who are acutely infected and some chronically infected indiviudals
HBeAb	Positive	Marker of decreased infectivity for chronically infected individuals
HBV DNA	Positive	Used to assess and monitor treatment of patients with chronic HBV infection

Source: Immunization Action Coalition: Vaccinate Adults.
[http://www.immunize.org/catg.d/p2110.pdf]

*Post-vaccination testing, when recommended, should be performed 1 to 2 months following the last dose of HBV vaccine. Infants born to HBsAg-positive mothers should be tested at 9 to 15 months of age or 1 month after the last dose, whichever happens first.

†1. May be recovering from acute HBV infection.
2. May be distantly immune, but the test may not be sensitive enough to detect a very low level of HBsAb in serum.
3. May be susceptible with a false-positive HBcAb.
4. May be chronically infected and have an undetectable level of HBsAg present in the serum.

Table 2. The Immunoprophylaxis of Infants Born to HBsAg-positive Mothers

[*]Pediatric formulation of either RECOMBIVAX HB or ENGERIX-B.
[†]COMVAX (combined hepatitis B-Hib conjugate vaccine) and PEDIARIX (combined hepatitis B-
DTaP-IPV vaccine) cannot be administered at birth or before 6 weeks of age.

Single-antigen vaccine[*]		**Single-antigen[*] + combination vaccine[†]**	
Dose	**Age**	**Dose**	**Age**
1[‡]	Birth (within 12 hours)	1[†,‡]	Birth (within 12 hours)
HBIG[§]	Birth (within 12 hours)	HBIG[§]	Birth (within 12 hours)
2	1-2 months	2[‖]	2 months
3	6 months[6]	3[‖]	4 months
		4[‖]	6 months (PEDIARIX)[¶] or 12-15 months (COMVAX)

[‡]Pediatric formulation of either RECOMBIVAX HB or ENGERIX-B can be used beginning at
birth.
[§]Hepatitis B immunoglobulin (0.5.mL) given intramuscularly in a separate site from vaccine.
[‖]PEDIARIX administered at 2, 4, and 6 months of age to complete immunization against hepatitis B and primary immunization against diphtheria, tetanus, pertussis, and polio. COMVAX administered at 2, 4, and 12 to 15 months of age to complete immunization against both hepatitis B and *Haemophilus influenzae* type b.
[¶]The last dose in the vaccine series should not be administered before age 24 weeks (164 days).

Table 4. Immunoprophylaxis of Infants Born to HBsAg-negative Mothers

Single-antigen vaccine[*]		Birth-dose[*] + combination[†]		Combination[†] without birth dose[‡]	
Dose	**Age**	**Dose**	**Age**	**Dose**	**Age**
1[‡]	Birth (before discharge)[§]	1[‡]	Birth (before discharge)[§]	1[†]	2 months[§]
2	1-4 months	2[†]	2 months	2[†]	4 months
3[‖]	6-18 months	3[†]	4 months	3[†,‖]	6 months (PEDIARIX) or 12-15 months (COMVAX)
		4[†,‖]	6 months (PEDIARIX) or 12-15 months (COMVAX)		

[*]**Pediatric formulation of either RECOMBIVAX HB or ENGERIX-B.**

[†]**COMVAX (combined hepatitis B-Hib conjugate vaccine) and PEDIARIX (combined hepatitis B-DTaP-IPV vaccine) cannot be administered at birth or before 6 weeks of age.**

[‡]**Pediatric formulation of either RECOMBIVAX HB or ENGERIX-B can be used beginning at birth.**

[§]**The first dose can be delayed until after hospital discharge only if there is a physician's order to defer the vaccine at birth based on specific documentation of a negative HBsAg test during this pregnancy. If the first dose is not administered before hospital discharge, it should be administered by age 2 months.**

[‖]**The last dose should not be administered before age 24 weeks (164 days).**

Table 3. Recommendations for Postexposure Prophylaxis after Percutaneous or Permucosal Exposure to HBV

Treatment				
Vaccination and antibody status of exposed person*	**Source HBsAg-positive**	**Source HBsAg-negative**	**Source unknown or not tested**	
			High Risk	**Low Risk**
Unvaccinated	HBIG† (1 dose) and begin hepatitis B vaccine series	Begin hepatitis B vaccine series	Begin hepatitis B vaccine series	Begin hepatitis B vaccine series
Previously vaccinated				
Known responder‡	No treatment	No treatment	No treatment	No treatment
Nonresponder‡				
Not revaccinated§	HBIG (1dose) and begin a revaccination series	No treatment; begin a revaccination series	HBIG (1 dose) and begin a revaccination series	Begin a revaccination series
After revaccination§	HBIG (2 doses)‖	No treatment	HBIG (2 doses)‖	No treatment
Antibody response unknown	Test for anti-HBs If adequate,‡ no treatment If inadequate, HBIG × 1 and vaccine booster	No treatment	Test for anti-HBs If adequate,‡ no treatment If inadequate, give vaccine booster and check anti-HBs in 1 to 2 months	

*Persons known to have been infected with HBV are immune and require no treatment.
†Hepatitis B immunoglobulin (0.6 mL/kg) administered intramuscularly.
‡Adequate response to anti-HBs $\geq$ 10mIU/mL after vaccination.
§Revaccination = additional 3-dose series of hepatitis B vaccine administered after the primary series.
‖First dose as soon as possible after exposure and the second dose 1 month after the first dose.